Sec 9-4: Rational Expressions

Simplifying rational expressions:

In simplest form

$\frac{x}{x-1}$ $\frac{2}{x^2+3}$

No common factors of numerator & denominator

Numerator & Denominator still have a common factor.

Not in simplest form

$\frac{x \div x}{x^2 \div x}$ $\frac{\frac{1}{x}}{x+1}$ $\frac{2(x-3)}{3(x-3)}$

$= \frac{1}{x}$ $= \frac{2}{3}$

complex fraction

Sec 9-4: Rational Expressions

Simplifying rational expressions:

Making sure the numerator and denominator have no common factors

1. Factor both the numerator and the denominator
2. Cancel any factors common to the numerator & denominator
3. State restrictions on the variables

Simplify each. State restrictions on the variables.

1. $\frac{12a^3b^7}{8a^2b}$

$\frac{3b^6}{2a^2}$

$a \neq 0$

$b \neq 0$

2. $\frac{2x^2 - 12x}{4x^3 - 12x^2 - 72x}$

$4x(x^2-3x-18)$

$\frac{2x(x-6)}{4x(x-6)(x+3)}$

$\frac{1}{2(x+3)}$ $x \neq 0, -3, 6$

Multiplying rational expressions

Simplify. State restrictions on the variables.

$\frac{2x^3 - 8x}{x^2 + 5x + 6} \cdot \frac{x^2 + 4x + 3}{6x^4 + 6x^3}$

Cross Cancel

$\frac{6x^3}{6x^3}$ $\frac{6x^3}{6x^3}$

$\frac{2x(x^2-4)}{} \cdot \frac{}{}$

$\frac{2x(x+2)(x-2)}{(x+2)(x+3)} \cdot \frac{(x+3)(x+1)}{6x^3(x+1)} = \frac{(x-2)}{3x^2}$ $x \neq 0, -2, -3, -1$

Dividing rational expressions

Simplify. State restrictions on the variables.

Instead of dividing multiply by the reciprocal.

$$\frac{4x^2-17x-15}{x^2-8x+12} \div \frac{16x^2+12x}{10x^4-360x^2}$$

x^2-36

$$\frac{(4x+3)(x-5)}{(x-6)(x-2)} \cdot \frac{10x^2(x+6)(x-6)}{4x(4x+3)}$$

$$= \frac{5x(x-5)(x+6)}{2(x-2)}$$

$x \neq$ 0, 6, 2, -3/4, -6